

WHAT IS CLAIMED IS:

1. A process gas for use during laser welding of nonferrous metallic workpieces with a laser beam focussed onto the workpiece to be welded, a laser diode being used as a laser beam source, comprising:

- 100% by volume carbon dioxide, or
- 100% by volume oxygen, or
- a binary gas mixture of carbon dioxide and argon, or
- a binary gas mixture of oxygen and argon, or
- a binary gas mixture of carbon dioxide and nitrogen, or
- a binary gas mixture of oxygen and nitrogen, or
- a binary gas mixture of carbon dioxide and oxygen, or
- a ternary gas mixture of carbon dioxide, argon and nitrogen, or
- a ternary gas mixture of oxygen, argon and nitrogen, or
- a ternary gas mixture of carbon dioxide, argon and oxygen.

2. A process gas according to Claim 1, wherein the process gas contains between about 15% and about 90% by volume of carbon

dioxide.

3. A process gas according to claim 1, wherein the process gas contains between about 45% and about 85% by volume of carbon dioxide.
4. A process gas according to claim 1, wherein the process gas contains between about 55% and about 80% by volume of carbon dioxide.
5. A process gas according to claim 1, comprising carbon dioxide and up to 50% by volume of oxygen.
6. A process gas according to claim 1, wherein the process gas contains between about 15% and about 90% by volume of oxygen.
7. A process gas according to claim 1, wherein the process gas contains between about 45% and 85% by volume of oxygen.
8. A process gas according to claim 1, wherein the process gas contains between about 55% and about 80% by volume of oxygen.

9. A process gas according to claim 1, comprising oxygen and up to 50% by volume of carbon dioxide.
10. A process for the laser welding of nonferrous metals, comprising:
providing one or more laser diodes as a laser beam source;
guiding at least one focussed laser beam to the workpiece surface to be machined; and
flowing a process gas against the workpiece surface,
wherein the process gas comprises a process gas according to claim 1.
11. A process according to claim 10, wherein the process gas is flowed in the direction of the normal line (at an angle of 90°) to the workpiece surface.
12. A process according to Claim 10, wherein the one or more laser diodes produce a wavelength of between about 700 nm and about 1,300 nm.
13. A process according to claim 10, wherein the one or more laser diodes produce a wavelength of between about 800 nm to about 1000 nm.

14. A process gas for use during laser welding of nonferrous metallic workpieces with a laser beam focussed onto the workpiece to be welded, a laser diode being used as a laser beam source, consisting essentially of:

- 100% by volume of carbon dioxide, or
 - 100% by volume of oxygen, or
 - a binary gas mixture of carbon dioxide and argon, or
 - a binary gas mixture of oxygen and argon, or
 - a binary gas mixture of carbon dioxide and nitrogen, or
 - a binary gas mixture of oxygen and nitrogen, or
 - a binary gas mixture of carbon dioxide and oxygen, or
 - a ternary gas mixture of carbon dioxide, argon and nitrogen, or
 - a ternary gas mixture of oxygen, argon and nitrogen,
- or
- a ternary gas mixture of carbon dioxide, argon and oxygen.